

An Additive Manufacturing Technique for the Production of Electronic Circuits, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



ABSTRACT

The proposed 9-month research project aims for the development of additive manufacturing techniques for the creation of electronic devices. It will develop an innovative additive manufacturing technique that combines the ink-based printing with laser melting technology to directly print a three-dimensional (3D) system with built-in electrical properties and functioning as an electronic device. The fundamental electronic device includes the resistor, conductor, semiconductor, insulator and capacitor. This proposed 3D printing technique involves (1) the development of five fundamental ink-based printing materials suitable for conductor, resistor, capacitor, semiconductor and insulator production; (2) the design of the five rotating injectors for five distinct ink-based materials; (3) the development of laser melting technology to provide on-demand melting and solidification of the dispensed ink-based materials; and (4) the evaluation of 3D printing control software.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: This proposed work will provide key elements required by the direct 3D printing of electronic devices. It potentially enables NASA the technology for advanced manufacturing process to produce electronics in space. It could result in a commercial 3D printing semiconductor materials that is crucial for in-situ resource generation of printed electronics for in-space advanced manufacturing and repair. - In-situ production of functional electronic/electromechanical devices on demand. - In space advanced manufacturing and repair, including printed electronics. - Influence and benefit human related systems or facilities operated temporarily or permanently in space. - New design techniques and software.

To the commercial space industry:

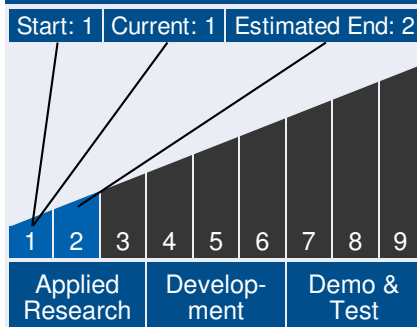
Potential Non-NASA Commercial Applications: - Direct printing of mechanical systems with build in electronic properties. -



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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

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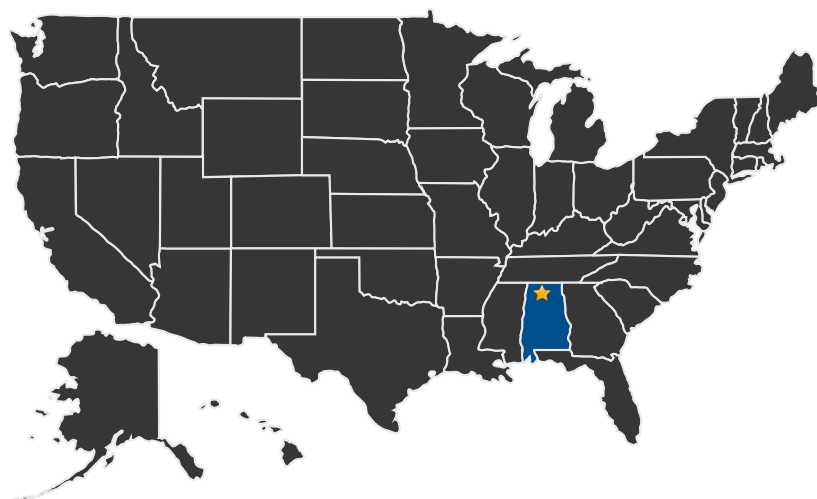
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Robotics and active mechanics. - Direct printing of various sensors. - New software (CAD) tools integrating functional electronic design with mechanical system design. - New multidisciplinary educational tools. Impact on the creation of new types of engineers.

U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Marshall Space Flight Center

Other Organizations Performing Work:

- Alabama A&M RISE Foundation (Normal, AL)
- Morningbird Media Corporation (Madison, AL)

PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/23171>)

Management Team *(cont.)*

Principal Investigator:

- Chance Glenn

Technology Areas

Primary Technology Area:

Materials, Structures, Mechanical Systems and Manufacturing (TA 12)

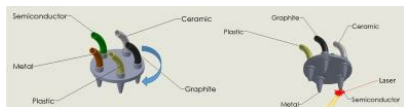
- └ Manufacturing (TA 12.4)
 - └ Electronics and Optics Manufacturing Process (TA 12.4.3)

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IMAGE GALLERY



*An Additive Manufacturing Technique
for the Production of Electronic Circuits,
Phase I*

DETAILS FOR TECHNOLOGY 1

Technology Title

An Additive Manufacturing Technique for the Production of Electronic Circuits, Phase I

Potential Applications

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